

Notice of Allowability

Application No.

10/713,059

Examiner

Raquel Y. Gordon

Applicant(s)

SILVERBROOK, KIA

Art Unit

2853

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to application filed 11/17/2003.
2. ☒ The allowed claim(s) is/are 1-6.
3. ☒ The drawings filed on 17 November 2003 are accepted by the Examiner.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some* c) ☐ None of the:
 1. ☐ Certified copies of the priority documents have been received.
 2. ☒ Certified copies of the priority documents have been received in Application No. 09/966,289.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____

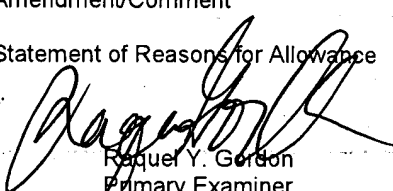
Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
6. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
 - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
 - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
 - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
7. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☒ Information Disclosure Statements (PTO-1449 or PTO/SB/08),
Paper No./Mail Date 11/17/2003
4. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____


Raquel Y. Gordon
Primary Examiner
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Reasons for allowance

The following is a statement of reasons for allowance:

Upon consideration, the inclusion of the claimed pagewidth printhead assembly as claimed in the combination, is not found in the prior art. This difference is considered patentable over the prior art and reflects an improvement in the field of endeavor since the following apparatus claim limitations reflect an improvement in the field of endeavor and over the prior art of record.

The primary reasons for allowance is, with respect to claims 1-14 the prior art does not teach the following claimed combination:

1. A thermal bend actuator which includes
a wafer substrate;

an elongate actuator arm that is fixed to the substrate at a fixed end, the elongate actuator arm including a heater layer of a conductive material and a dielectric; resiliently flexible layer, the heater layer defining a heater circuit which is connected to an electrical potential;

a working member that is fixed to an opposite free end of the actuator arm; and control logic circuitry that is positioned on the substrate, between, and generally aligned with, the heater layer and the substrate, the control logic circuitry being interconnected between a data input means and the heater circuit and including register circuitry connected to the data input means to generate an enabling signal and firing circuitry connected between the register circuitry and the heater circuit to close the

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heater circuit on receipt of the enabling signal so that said electrical potential generates a current in the heater circuit, resistively to heat the heater layer, at least the heater layer being of a material having a coefficient of thermal expansion which is such that the heater layer can expand on heating and contract on cooling to do work, the heater layer being positioned so that the elongate actuator arm experiences differential thermal expansion and contraction and thus reciprocally displaces the working member.

6. A micro-electromechanical device that comprises

a substrate; and

a plurality of thermal bend actuators that are positioned on the substrate, each thermal bend actuator comprising an elongate actuator arm that is fixed to the substrate at a fixed end, the elongate actuator arm including a heater layer of a conductive material and a dielectric, resiliently flexible layer, the heater layer defining a heater circuit which is connected to an electrical potential;

a working member that is fixed to an opposite free end of the actuator arm; and control logic circuitry that is positioned on the substrate between, and generally aligned with, the heater layer and the substrate, the control logic circuitry being interconnected between a data input means and each heater circuit and including register circuitry connected to the data input means to generate an enabling signal and firing circuitry connected between the register circuitry and the heater circuit to close the heater circuit on receipt of the enabling signal so that said electrical potential generates a current in the heater circuit, resistively to heat the heater layer, at

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least the heater layer being of a material having a coefficient of thermal expansion which is such that the heater layer can expand on heating and contract on cooling to do work, the heater layer being positioned so that the elongate actuator arm experiences differential thermal expansion and contraction and thus reciprocally displaces the working member.

While Choi et al. (US005909230A) teach a similar invention (see 111 and see fig 9B), Choi et al. does not teach the claimed arrangement of the combination of features disclosed by the instant invention, as emphasized above.

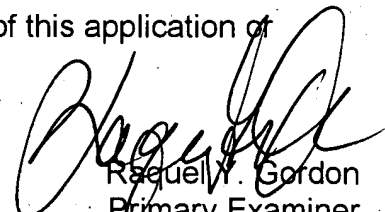
The independent claims are deemed allowable over the art of record. The dependent claims depend from the allowed base claims and are also deemed to be allowed.

Contact Information

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Raquel Y. Gordon, whose telephone number is (571) 272-2145. The Examiner can normally be reached on M Tu Th and F 8:30-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Stephen Meier can be reached on (571) 272-2149. A fax number is available upon request.

Any inquiry of a general nature or relating to the status of this application or proceeding may be directed to the Examiner or Supervisor.


Raquel Y. Gordon
Primary Examiner
Art Unit 2853
April 14, 2004

**RAQUEL GORDON
PRIMARY EXAMINER**